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Saturday, October 17, 2009

How to save yourself from chasing futuristic red herrings

For many people, the often outlandish proposals and predictions of futurists are just obviously impractical and are to be laughed off. This attitude, irrational is it may seem to futurists of the stripe who take outlandish ideas very seriously, is itself not to be sneered at -- automatic unbelievers in the alien save themselves from chasing many red herrings. Those who laugh at futurism because they are unimaginative dolts I will not try to defend, but those who laugh at futurism when futurists take themselves too seriously are usually spot-on. For those of a more serious nature and intellect who want to actually figure out the flaws in futuristic ideas, here are some heuristics:

(1) Find **the easier thing**. If there is an easier way to get much of the value from a proposal, ask yourself, why hasn't somebody pursued this easier way? For example, seasteading proposes the creation of novel structures for people to settle permanentantly in the ocean. Ask yourself, why don't there already exist communities that live permanently on cruise ships? Why haven't oil companies moved the families of their offshore platform workers out to live where the work is?

(2) Look to see if if the futurists have proposed **experiments** that can be done much sooner and more cheaply that would verify or falsify the propsosal or prediction. Many of the "most important", in terms of perceived future impact, hyper-futuristic ideas are conveniently unfalsifiable: artificial intelligence, uploading of consciousness, and so on. There are a near-infinite number of unfalsifiable theories that our imaginations could dream up, making the odds of any given such theory to be true about zero. The ability to conduct such dispositive experiments, the ability to prove a hypothesized event false if certain conditions occur, paradoxically makes that event far more likely. A related heuristic is to be very leery of ideas that, as is said of fusion power, are "always thirty years in the future". If the futurist can't explain why the futurist of 30 years ago who predicted something similar was wrong, that futurist should indeed be laughed at, early and often. Far too many futurists are so futuristic that they know little about the past which they purport to be projecting. Some don't even know when predictions similar to theirs were already made decades ago, and were already supposed to have come true. At the same time, be wary of futurists who are not willing to make short-term predictions, lest we obtain a track record of the vast uncertainty involved in their brand of futurism.

(3) Except for rare phenomena of high predictability, such as the orbits of planets, **past performance does not guarantee future results.** Futurists often chart exponential curves of growth in some measure of technology: the speed of transport, the number of transistors that can fit on a chip, and so on. The first half of a logistics curve looks much like an exponential curve. You can fit an exponential curve to the data points, but it's really a logistic curve, which in the long run, and possibly even in the short run, will lead to a radically different kind of future. Because of physical limits and human psychology, reality far more closely resembles logistic curves than exponential ones. For example, world population growth seemed to follow an exponential curve until about the 1960s,

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Nick Szabo

"A premier thinker about history, law and economics, and the lessons they have for security." -- Adam Shostack, Emergent Chaos

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when it flipped into a quite different mathematical regime. This transition to sub-exponential growth started much sooner in the developed world, which should have been but was not a clue for the population alarmists. As for physical limits, a good example is transport speed: it seemed to be growing exponentially until it hit the sound barrier in earth's atmosphere and the implacable nature of earth's gravity well beyond it in the latter half of the twentieth century. More on the dubious nature of exponential projections here.

(4) Beware of the prophets of **false certainty**. These are people who focus on one out of many possible outcomes, or take very seriously unfalsifiable predictions, or follow exponential projections, or have neglected to find the easier thing, and pretend, because nobody has proven them wrong, that their version of the future has a high probability. We have, for example, the Bayesiologists, who, while to their credit are at least aware of first-order uncertainty (known unknowns), neglect the higher-order uncertainties (unknown unknowns) inherent in most futurism and demand that we make some intuitive guess as to the numerical probability of their predicted event. (When asked for an intuitive numerical guess about some hyper-futuristic prediction, "50%, plus or minus 50%, distribution function unknown" is usually the best answer).

(5) Look at **interests**. You may not understand the science involved, but individual and institutional interests are human universals. Take astrobiology, for example. Here we have a science without a subject. Now the astrobiologists to a man argue that extraterrestrial life must be common, indeed that it may well be right around the corner underneath the ice of Enceladus or Europa or on one of those exciting new exoplanets. There appears to be, as many activists like to say about global warming, a "consensus" among the astrobiologists about the ubiquity of life in the universe. But only primitive life, of course -- otherwise the uncomfortable fact that we have never observed the signs of any artificial surfaces, despite observing billions of stars in our own galaxy and billions of other galaxies, would rear its inconvenient head. Thus the Rare Earth Hypothesis, in which for clever reasons life is supposed to almost always stops evolving beyond some primitive stage, in sharp contrast to the ongoing evolution of life to higher complexity in the only history of life we have actually observed. Does the astrobiologists' consensus reflect their expertise and your ignorance in astronomical and biological matters, or does it reflect something else? Consider this -- if you were skeptical about this astrobiological thesis, why would you become an astrobiologist in the first place, risking your career on a science that has no subject? If the politicians and academic boards who fund them ever became convinced that extraterrestrial life probably does not exist anywhere where we will be able to observe it before they retire, astrobiologists would have to find new jobs. This is a career for true believers. Beyond this rather dramatic selection effect, we have individual and institutional self-interest to keep the argument going -- to fund their careers, astrobiologists must persuade us that life in universe is common, common enough that we should fund multibillion dollar telescopes and spacecraft and, of course, grant copious amounts of research funding to them in order to look for it within or astronomically very near our solar system, which is as far as we can observe the signs of primitive life. Even if you know nothing whatsoever about either astronomy or biology, but do understand a thing or to about humans, you are wise to be highly skeptical of the claims of astrobiologists.

(6) Be especially skeptical of **political futurism**. From NASA's Shuttle and Space Station, which were supposed to revolutionize space industry, to the politicization of doom-and-gloom scenarios such as overpopulation and the supposed dire consequences of global warming, politics mixed with futurism has a very poor track record. By contrast, private entities like the Singularity Institute, Foresight Institute, and so forth, while even more outlandish and preposterously self-serious, can provide creative starting points for brainstorming towards more practical ideas and are relatively harmless.

(That leads me to my last heuristic -- (7) avoid futurists who can't **laugh at themselves**).

Futurism at its best is a creative and entertaining game of ideas. Playing with outlandish ideas can be very productive -- for example, the Easier Thing on occasion may turn out to actually be a good idea you can implement now, and you arrive at the easier thing by starting with an outlandish idea. I occasionally explore outlandish futuristic ideas here at Unenumerated, which prides itself on an unending variety of topics. There is nothing to sneer at about futurism as fun unless you have an unimaginative rock for a brain. However, those who take these ideas too seriously, or have created a false sense of certainty about them, do deserve a few guffaws.

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Posted by Nick Szabo at 4:02 PM

14 comments:

M. Simon said...

Polywell Fusion Reactor experiments.

10:39 PM

George Weinberg said...

Some of these don't seem to be of much practical consequence anyway. I don't know if extraterrestrial bacteria or common, rare, or nonexistent, but if I did believe that they were common, I can't see how it would harm me to be wrong, nor benefit me to be right.

10:27 AM

nick said...

George, if like Nick Bostrom and Robin Hanson you infer things from astronomy and the Drake Equation that we can get a far better estimate of by observing ourselves, then you want life to be very rare. Because if it is as common as the astrobiologists claim, then there must be a "Great Filter" that brings a stop to evolution about 99.99999999999999999% of the time somewhere between primitive life and building big artifacts like Dyson Spheres that we should be observing in place of unshaded stars and galaxies but don't. Given yet another splendid assumption about distribution functions in the face of ignorance (no such thing as "distribution function unknown" here), a significant fraction of that Great Filter probably still lies ahead of us, so that there is a 99.9999999% chance of humanity being wiped out sometime between now and permanent space colonization. Which means that our already pitifully brief lifespans will likely be cut further short by some imminent disaster. In other words, if we find primitive life on Europa, prepare to die. (Don't quote me on the decimal places, I just kept the 9 key pressed down until I figured it was reasonably representative of their argument).

5:55 PM

nazgulnarsil said...

not making falsifiable predictions would seem a selection criteria among competing memes. However, Robin Hanson draws attention to the fact that people don't pay much attention to track records, thus making it a weak effect.

10:17 PM

Anonymous said...

nick: or, you'd conclude there's new physics that when discovered would make megastructures like dyson spheres look like a stupid idea to those advanced enough to contemplate their construction.

Not much point thinking too much about what that physics might be (if it existed) but as long as you're doing bayesiology you may as well include it as a way of explaining why a galaxy teeming with sentients lacks visible megastructures.

8:14 AM

nick said...

Anonymous, you can explain that any possible observation is compatible with any pet theory by assuming some arbitrary "new physics." It's completely unfalsifiable. Since one can imagine a nearly infinite number of different pet theories, the chances that any given such pet theory is true is negligible.

10:57 AM

Anonymous said...

nick:

Of course, which is why it's not worth spending a lot of time on it.

You appear to believe that advanced sentients would go about constructing megastructures; what makes this falsifiable?

4:55 PM

Anonymous said...

If it's not clear: by "megastructure" I meant to say dyson spheres (and similar structures).

4:57 PM

Alrenous said...

If you really want to analyze megastructure probability properly you need to combine the logistics curve with unknown unknowns.

Take into account that you don't know what you don't know about when structures stop being viable. You can't rule out complex ET, which means astrobiologists get burned coming and going.

There's probably something wrong with estimating the probability of truth based on how many ideas you can come up with.

It's more that given a large number of possibilities, it's unfeasible even to mount the effort necessary to filter out the crap. Only below some ignorance threshold does the brainstorming process inform you about anything aside from your own brain.

5:54 PM

nick said...

The megastructure theory is readily falsifiable: if we discover ET that lives on planets rather than inside megastructures, before having discovered any living in megastructures, my theory will have been shown to have very deep problems. So it could be falsified tomorrow if we receive any such signal from a planet that is not accompanied by astrostructures. Even though NASA is so enthusiastic about the raft of new exoplanets that they sent a raft of Trekkie prayers to Gliese 581d recently via the Deep Space Network (on which I used to work), I am about as confident as I can be about any futuristic prediction that we will get no ET signal from such a planet: if you think about the expansionist nature of life and society, and cosmic timeframes, the odds are extremely stacked against it.

OTOH, the theory that all ETs remain huddled forever on their little planets is not readily falsifiable: the lack of signals by this theory does not mean that ETI are rare, it just means that ETI are cowardly folk who cleverly hide from astronomers, like elves and

leprechauns hide from anthropologists.

It is useful to think about what other experiments we could do to get a grip on the probability short of actually observing ETI. Trouble is everything I can think of confirms it: the way plants colonize lifeless areas within a few years after a volcano destroys life, the way humans colonized the earth, the way forests shade most of the sun in their competition for sunlight, and so on. Our observations confirm rather than falsify the idea that life and society are generally expansionist, and it is irrational to expect that all ETI will be otherwise, utopian ideas about "progress towards zero growth" notwithstanding. Even if the stay-at-home civilizations far outnumber the expansionist civilizations, we are far more likely to observe the latter.

BTW, I did not mean to suggest that all progress is logistic. In the case of physical expansion it is polynomial or less: cubic (in three dimensions) or square when the vertical dimensions of the galactic disk are reached.

This is by no means the most important issue of the day, but it is an area I know well that illustrates your tax money at work. Astrobiology, far more exciting than boring old geology, seems to have become NASA's primary rationale for space science funding, despite it being a science without a subject. For reasons I explain above, astrobiologists have strong incentives to grossly exaggerate the probability of finding ET life. For various reasons I expect the mainstreaming of astrobiology to become the mainstreaming of SETI, and for SETI to become a big justification for NASA's science budget in the future. That may be wrong but it's the trend I'm seeing with the exoplanet discoveries.

Far more important is the trillion-dollar debate over climate science. This also seems to involve quite a bit of quasiscience and pseudoscience on both sides, and quite a lot of government-funded scientists who claim they are neutral. Since many people know more about the climate than I, I will leave that debate to others, but some of the general points I make above, that I have learned from observing the debates about future technology and SETI and astrobiology (which I do know quite a bit about) may also apply to the debate over predicting the climate decades out. Are, for example, computer climate models imminently falsifiable? Which climate scientists are willing to make short-term predictions? How do the various scientists, pro or con, justify their funding, and how might this bias their stated or actual beliefs? These and many similar questions related to the above points about futurism may be useful to ask about climate science.

10:44 AM

William said...

There does exist a community living permanently on a cruise ship called "The World".

Either way, the "find the easier thing" heuristic reminds me of a joke.

An economist is walking through the city with a student. They see a twenty dollar bill lying on the sidewalk.

"Look, a twenty dollar bill," says the student.

"Nonsense," says the economist. "If there were a twenty dollar bill on the sidewalk, someone would already have picked it up."

3:23 PM

nick said...

Interestingly enough, switching from the world of fictional jokes to the real one, I have never in my life found a bill of any denomination lying on a sidewalk. But I've dropped a few, which I promptly picked up.

12:22 AM

Paul Baclace said...

I once saw a $5 bill on the sidewalk in Palo Alto, half a block from University Ave close to Stanford.

I laughed out loud but did not even consider picking it up because (a) it might be amusing to the next person, (b) a homeless person might find it much more useful than I would, and (c) it is quite possible someone was doing a yippy econ experiment and I was happy to play the meta joke.

8:05 PM

Martin Schwarz said...

I think your position on astrobiology is quite harsh. Even without a confirmation of ET life, the fact that life has occured once estabilishes a positive probability of this happening else where. In my point of view, it's a worthwhile effort to put lower and upper bounds on the various conditional probabilities in Drake's formula. Two decades ago, we didn't know whether other planets exist around other stars than our own. Now we know. Until just a few years ago, we didn't know whether planets exist in habitable zones around other stars. No we know. We also didn't know whether planets quite similar to our own exist around suns quite similar to ours. Now we know. All these rock-solid astronimical discoveries put lower bound on various conditional probabilites that lead up to the probability of existence of life on those planets and so forth. It might turn out that one element of this product of probabilities is indeed extremely small making it unlikely for us to expect to find life on other planets. But yet, its true science to bound these probabilities and thus gain a better understanding of the universe we live in.

8:01 AM

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